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**RECHARGEABLE CLEANING  
DEVICE, METHOD AND SYSTEM**

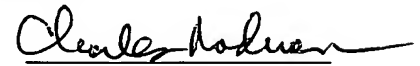
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RECHARGEABLE CLEANING DEVICE, METHOD AND SYSTEMTECHNICAL FIELD

5           The present invention relates to a cleaning device for picking up debris, a cleaning device system and a method for picking up debris. Further, the invention relates to a method, system and device for the removal of lint and other like debris by the use of detachable cleaning pads having thereon an application of an amount of an adhesive material which is rechargeable or which may be applied in a plurality of layers.

BACKGROUND OF THE INVENTION

10           Various types of lint cleaning devices have been suggested by the prior art. For example, U.S. Pat. No. 4,727,616 issued to Kucera et. al., discloses a cleaning roller which comprises a support; a cylinder carried by the support for rotation about its longitudinal axis; and a plurality of windings of material wound about the cylinder. Each of the windings has an outwardly facing adhesive surface and has a continuous cut along the substantial portion of a line extending across each winding to define a circumferentially extending narrow band of uncut windings disposed proximate one edge of the cylinder.

20           U.S. Pat. No. 4,083,075, issued to M. A. Hester, discloses a device comprising a housing having an elongated handle connected thereto and a tape cartridge disposed therein, the housing further comprising means for selectively advancing the tape and the cartridge to present a tacky surface for contacting and thus removing litter. The tape cartridge comprises a first reel for supplying a length of tape and a second reel for taking up the length of tape. The tape advancing means rotates the second reel to thereby advance a length of tape from the first reel in response to a sequential movement of the cartridge from the first extended position to a second retracted position and back to the extended position.

30           U.S. Pat. No. 3,040,352, issued to N. B. Vian, discloses a device with a body portion thereof whereby a tubular roll of material having a sticky surface may be frictionally retained thereon. The body portion has a configuration that coacts with the tubular roll of

adhesive material so that the roll of adhesive material is positively retained thereon without the use of special fasteners until removed by the user of the device.

U.S. Pat. No. 3,742,547, issued to M. Sohmer, discloses a device which  
5 includes a tube-like roller having a length of pressure sensitive adhesive material wound around the periphery of the roller. Removable disk shaped end members enclose the ends of the roller. An inverted V-shaped holder is connected to the end members. A handle extends perpendicular to the longitudinal axis of the roller and is connected to the apex of the inverted V-shaped holder.

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U.S. Pat. No. 5,553,344 issued to Rosenkrantz discloses a cleaning device that includes a support member having a first side and second side, an elongated handle connected to the first side, and a plurality of sheets of adhesive material are attached to the second side. The sheets are arranged in a sandwich type fashion. Each sheet has an  
15 outwardly facing tacky adhesive surface and is adapted to be exposed when a preceding outermost sheet is removed. The tacky adhesive surface serves to pick up lint and other light substances when placed against it.

However, none of the prior art devices disclose a cleaning device making use  
20 of a detachable, disposable-cleaning pad which acts as a substrate for a rechargeable adhesive material.

### SUMMARY OF THE INVENTION

25 The within invention is directed a cleaning device for picking up debris, a method for picking up debris using a cleaning device and a cleaning device system. Preferably, the method of the invention is performed using the preferred form of the cleaning device or the cleaning device system as described herein, however, any suitable cleaning device or cleaning device system having the properties discussed herein may be  
30 used.

The device, system and method may be used for picking up any debris such as lint or other undesirable material from a surface. For this reason, the within invention

has been found to have particular application to the hospitality industry for use in cleaning up lint and other debris which is not easily or readily picked up by a vacuum cleaner.

However, it is understood that the device, system and method may also be used in picking up or retrieving any desired object or material from a surface and may be used in a variety of further applications. For instance, other potential applications of the device, system and method include: in the airline industry, for cleaning up the cabins of airplanes; for cleaning ceiling vents around which dust has accumulated; for cleaning tile and ceramics; for use by handicapped persons in picking up objects such as dropped car keys, eyeglasses, etc.; for forensic purposes for evidence gathering by police; and for cleaning up pins or other hazardous objects in hospitals, change rooms and in manufacturing plants.

Further, the device and method may be used to pick up debris or materials from any surface, but is particularly suited in the preferred embodiment for use in picking up debris from carpeted areas or other flooring surfaces.

In a first aspect of the invention, the invention is comprised of a cleaning device for picking up debris, comprising:

- (a) a support member, wherein the support member is comprised of a support surface;
- (b) a cleaning pad having an attachment side and a substrate side, wherein the attachment side is releasably attached with the support surface and wherein the substrate side is adapted to accept an application of an adhesive material.

The cleaning device may be further comprised of the adhesive material and may also be further comprised of an adhesive material applicator for applying the adhesive material to the substrate side of the cleaning pad.

In a second aspect of the invention, the invention is comprised of a cleaning device system comprising:

- (a) a support member, wherein the support member is comprised of a support surface;
- 5 (b) a cleaning pad having an attachment side and a substrate side, wherein the attachment side is adapted to be releasably attached with the support surface and wherein the substrate side is adapted to accept an application of an adhesive material;
- 10 (c) an amount of the adhesive material; and
- (d) an adhesive material applicator, for applying the adhesive material to the substrate side of the cleaning pad.

15 In the first and second aspects of the invention, the support member may have any shape, configuration or dimensions suitable for the intended application of the device and system and capable of providing the necessary support surface for releasable attachment with the cleaning pad. Specifically, the support member is provided to support the cleaning pad in the manner described herein, as well as to facilitate the use of the device  
20 or system by the user. Thus, the shape, configuration and dimensions are selected to be compatible with the desired or intended use.

In the preferred embodiment, the support member includes a planar support surface for releasable attachment with the cleaning pad. The support surface is preferably  
25 planar to facilitate the ease of attachment of the cleaning pad thereto and to facilitate the use of the device or system for the picking up of debris from a planar surface such as the ground or floor. However, the support surface may have any other shape or configuration permitting the releasable attachment of the cleaning pad and permitting the use of the cleaning pad on the intended surface to be cleaned.

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To facilitate the use of the device or system, each of the device and the system is preferably further comprised of a handle connected with the support member. The handle may have any shape or dimensions suitable for grasping by the user or compatible

with being held by hand. As well, the handle, and particularly its length, may be configured to permit the user to contact a surface with the cleaning pad without the need to bend over or stoop (i.e. to pick up debris from the floor) or to contact a surface at a distance from the user (i.e. to clean the ceiling or other elevated surface). Further, the handle itself may be  
5 formed by a single structural member or element or it may be comprised of a plurality of structural members or elements, either permanently or detachably connected or fastened together, to form the complete handle.

The handle may be constructed of any suitable material or combination of  
10 materials, including wood, metal, plastic, fiberglass, or composites. Preferably the handle is relatively sturdy yet lightweight. In the preferred embodiment, the handle is constructed essentially of tubular aluminum.

The handle may be connected with the support member in any manner and  
15 by any structure or mechanism permitting the gripping of the handle by the user to use the device or system in the intended fashion. For instance, the handle may be integrally formed with the support member to provide a single unit or member. Alternatively, the handle may be rigidly or movably connected with the support member, either permanently or detachably. For example, the handle may be detachably connected with the support  
20 member so that the handle can be removed for certain applications of the cleaning device or so that different lengths and types of handles can be connected with the support member for different applications of the cleaning device.

Finally, the handle may be connected with the support member at any location  
25 or position on the support member. However, preferably, the handle is connected at a location or position which does not interfere with the attachment of the cleaning pad with the support surface and which facilitates the use of the device or system by the user. In the preferred embodiment, the handle is connected with the support member at a location or position opposed to the support surface. As a result, the user may relatively easily apply  
30 pressure through the handle to the cleaning pad attached to the support surface in order to pick up the desired object or debris.

In addition, although the handle may be rigidly or fixedly connected with the support member, the handle is preferably movably connected with the support member to permit adjustment of the angle between the handle and the support member. More particularly, the handle is preferably pivotably connected with the support member. In the preferred embodiment, the handle is pivotably connected with the support member such that the handle is capable of pivoting about two axes relative to the support member.

Any mechanism or structure may be utilized which permits the desired pivoting motion. For example, the handle may be connected with the support member using a ball joint structure or some other type of articulating joint as is known in the art.

In the preferred embodiment, the handle is connected with the support member using a universal joint structure which includes an upper swivel and a lower swivel which provide for rotation about two axes oriented at right angles to each other. In the preferred embodiment the lower swivel is comprised of a lower pivot pin or shaft mounted on the support member which engages the lower end of a coupling member which forms part of the lower end of the handle, and the upper swivel is comprised of an upper pivot pin or shaft mounted on the handle which engages the upper end of the coupling member and thus connects the coupling member with the remainder of the handle.

As indicated, the cleaning pad has an attachment side and a substrate side. In the device, the attachment side is releasably attached or attachable with the support surface. In the system, the attachment side is adapted to be releasably attached with the support surface. In each of the device and the system, the attachment side may be comprised of any material, substance, means, mechanism or structure suitable for, and capable of, releasably attaching the attachment surface with the support surface so that the cleaning pad may be removed as desired or as required in order to permit the attachment of a replacement cleaning pad.

Preferably, each of the device and system is further comprised of a releasable attachment mechanism for releasably attaching the attachment side of the cleaning pad with the support surface. Any releasable attachment mechanism which facilitates the releasable attachment of the attachment side with the support surface may be used. However,

preferably, the releasable attachment mechanism is comprised of a hook and loop fastening system.

Any hook and loop fastening system capable of retaining or maintaining the attachment of the cleaning pad to the support member during use of the device or system may be used. In other words, the hook and loop fastening system is to be selected to be capable of maintaining the attachment upon exposure of the cleaning pad to stresses or forces typically or reasonably anticipated to be encountered during use.

Further, the hook and loop fastening system is preferably comprised of a hook portion associated with one of the support surface and the attachment side and a loop portion associated with the other of the support surface and the attachment side. In the preferred embodiment, the hook portion is associated with the support surface and the loop portion is associated with the attachment side.

The hook portion may be connected, affixed, fastened, mounted or otherwise associated with one of the support surface and the attachment side of the cleaning pad in any manner and by any mechanism such that movement of the hook portion relative to the support surface or the attachment side is inhibited, particularly during use of the device or system.

The hook portion may be removably or detachably connected, affixed, fastened or otherwise mounted with one of the support surface and the attachment side of the cleaning pad, thus facilitating relatively easy replacement of the hook portion, if necessary. Alternatively, the hook portion may be integrally formed with one of the support surface and the attachment side of the cleaning pad.

Preferably, however, the hook portion is fixedly or permanently connected, affixed, fastened or otherwise mounted with one of the support surface and the attachment side of the cleaning pad. In the preferred embodiment, the hook portion is fixedly attached with the support surface. More particularly, the hook portion is comprised of a fabric hook material which is glued to the support surface such that the support surface comprises the hook material.



Similarly, the loop portion may be connected, affixed, fastened, mounted or otherwise associated with one of the support surface and the attachment side of the cleaning pad in any manner and by any mechanism such that movement of the loop portion relative to the support surface or the attachment side is inhibited, particularly during use of the device or system.

The loop portion may be removably or detachably connected, affixed, fastened or otherwise mounted with one of the support surface and the attachment side of the cleaning pad, thus facilitating relatively easy replacement of the loop portion, if necessary. Alternatively, the loop portion may be integrally formed with one of the support surface and the attachment side of the cleaning pad.

Preferably, however, the loop portion is fixedly or permanently connected, affixed, fastened or otherwise mounted with one of the support surface and the attachment side of the cleaning pad. In the preferred embodiment, the attachment side of the cleaning pad is comprised of the loop portion. More particularly, the loop portion is comprised of a fabric loop material, which may be referred to as the brush, which is heat laminated to the cleaning pad such that the attachment side comprises the loop material.

The cleaning pad may be comprised of a single material and a single layer of material such that the attachment side and the substrate side are comprised of the same material. Preferably, however, the attachment side of the cleaning pad is comprised of an attachment layer and the substrate side of the cleaning pad is comprised of a substrate layer so that it is not necessary for a single material to exhibit the preferred characteristics of both the attachment side and the substrate side of the cleaning pad.

Thus, the cleaning pad is preferably comprised of at least two layers, particularly the attachment layer and the substrate layer. However, one or more further layers may be positioned between the attachment and substrate layers. In addition, the layers of the cleaning pad may be removably or fixedly connected, affixed, fastened or otherwise mounted together to provide the cleaning pad. The layers may be so affixed by any material, substance, means, mechanism or structure suitable for, and capable of,

affixing the layers in a manner inhibiting the relative movement of the layers during use of the cleaning pad. Alternatively, the layers of the cleaning pad, including the attachment layer and the substrate layer, may be integrally formed with each other to provide the cleaning pad. In the preferred embodiment, the cleaning pad is comprised of the attachment  
5 layer and the substrate layer which are fixedly attached to each other by heat lamination.

As discussed above, the substrate side of the cleaning pad is adapted to accept an application of an adhesive material. The substrate side of the cleaning pad may be comprised of any material, substance, means, mechanism or structure suitable for, and  
10 capable of, accepting the application of the adhesive material thereon.

In the preferred embodiment, the substrate side of the cleaning pad is comprised of a substrate layer as described above. The substrate layer of the cleaning pad may be comprised of any substance, material or fabric suitable for, and capable of,  
15 accepting the application of the selected adhesive material thereon.

Preferably, the substrate layer is selected such that the adhesive material is not significantly absorbed by the substrate layer or such that the adhesive material does not significantly permeate or impregnate the substrate layer. In other words, it is preferred that  
20 the substrate layer permit a substantially surface application of the adhesive material only so that the consumption of adhesive material applied to the substrate layer is minimized. The substrate layer preferably also provides a resilient surface so that the substrate layer can conform to the surface from which debris is to be collected, thus enhancing the effectiveness of the cleaning device or system.

25 It has been found that both of these objectives can generally be achieved if the substrate layer is comprised of a foam material such as a polyolefin foam material. Although any polyolefin foam material capable of accepting the application of the adhesive material in the described manner may be used, the substrate layer is most preferably  
30 comprised of a crosslinked closed cell polyethylene foam material. Crosslinked foams are generally stronger materials than non crosslinked foams, while closed cell foams tend to absorb (and thus consume) less adhesive material than open cell foams.

Although foam materials have been found to be generally suitable for use as the substrate layer, any other material capable of, and suitable for, accepting the adhesive material may also be used for the substrate side of the cleaning pad, with varying results depending upon the application of the cleaning device or system.

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The adhesive material is applied to the substrate side of the cleaning pad. Thus, in the preferred embodiment, the adhesive material is particularly applied to the substrate layer. When the substrate side of the cleaning pad contacts the debris, the debris adheres to the cleaning pad. The adhesive material may be comprised of any material,  
10 substance, chemical composition or combinations thereof suitable for, and capable of, causing the desired debris to adhere to the cleaning pad. Thus, the adhesive material and its particular properties will be selected to be compatible with both the substrate layer and the debris or object to be picked up by the cleaning pad.

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For example, any suitable polymer may comprise the adhesive material including a pressure sensitive adhesive, an adhesive polymer, a tacky polymer or combinations thereof.

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Preferably, the adhesive material has one or more of a number of various preferable properties. Ideally, the adhesive material will exhibit each of the desired properties as discussed below.

25

First, the adhesive material is preferably substantially non-transferable. In other words, it is desirable that no amount, or no significant amount, of the adhesive material be transferred from the substrate side of the cleaning pad to the surface being  
cleaned upon use of the cleaning pad.

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Second, the adhesive material preferably has a curing time of less than about one minute after it is applied to the substrate side of the cleaning pad. More preferably, the adhesive material has a curing time of less than about 30 seconds after it is applied to the substrate side of the cleaning pad. A relatively short curing time is preferred so that the user of the cleaning pad need not wait an inordinate length of time before being able to use the cleaning pad after the application of the adhesive material. Further, as discussed below, in

the preferred embodiment the adhesive material is applied as a spray using an adhesive material applicator. A quick curing time is desirable in this circumstance in order to minimize the effects of any over-spray. Over-spray is an amount of the adhesive material which is sprayed into the atmosphere but does not actually contact the cleaning pad. It is desirable that any over-spray dry quickly in the atmosphere before contacting any undesired surfaces. Ideally, any over-spray will dry or cure within a distance of 18 inches (45.72 cm) from the spray applicator.

Third, the adhesive material should have a tack value which is sufficiently high to enable the cleaning pad to pick up the "target" debris effectively. The tack value refers to the maximum adhesive strength of the adhesive material. The desirable tack value will vary depending upon the particular use of the device or system and the properties, including the weight, of the debris or other material to be picked up by the cleaning pad.

For example, if the device or system is intended to be used to pick up "debris" consisting of objects such as dropped keys, eyeglasses etc., the adhesive material will require a higher tack value than if the device or system is intended to be used to pick up debris such as lint, grass, pins etc. As a result, the term "debris" when used herein includes any material or object which is desired to be picked up by the cleaning device, including, but not limited to material commonly found on floors and carpets such as lint, dirt, grass, thread, pins, paper clips and scraps of paper, as well as larger pieces of metal, plastic, wood, paper, fabric, glass and in certain applications, objects such as keys, eyeglasses, household items, small tools etc.

Fifth, the adhesive material is preferably non-toxic. Sixth, the adhesive material is preferably odorless.

As indicated, the device and system preferably include an adhesive material applicator. Any type of applicator may be used which is compatible for use with the particular adhesive material and which is suitable for applying the adhesive material to the substrate side of the cleaning pad.

The adhesive material and the adhesive material applicator may be integrated into a single component of the cleaning device system such as an aerosol applicator or they may be separate components of the cleaning device system.

5 For instance, the adhesive material applicator may be comprised of a brush, sponge, roller, tube or other suitable applicator device. However, in the preferred embodiment, the adhesive material applicator is an aerosol applicator and the adhesive material is integrated with the adhesive material applicator. In other words, an amount of the adhesive material is contained within the aerosol applicator so that the adhesive material  
10 can be sprayed onto the substrate side of the cleaning pad.

Further, the application of the adhesive material to the cleaning pad is referred to herein as charging the cleaning pad. The within invention permits the re-spraying or re-charging of the cleaning pad as necessary. Thus, in the preferred  
15 embodiment, a rechargeable cleaning pad is provided wherein the adhesive material may be applied by the adhesive material applicator to the substrate side of the cleaning pad in a plurality of layers.

Recharging of the cleaning pad will typically occur as the tackiness of the  
20 adhesive material decreases with use or as the cleaning pad becomes clogged or loaded with debris. Accordingly, the plurality of layers of adhesive material is generally interspersed with the debris. In other words, the recharging or the further layers of the adhesive material are applied to the substrate layer which has attached to it debris already picked up by the cleaning device.

25 The cleaning pad may be replaced when recharging of the cleaning pad is no longer possible or practical. Preferably, the cleaning pad will be rechargeable at least 6 times, and more preferably, at least 10 times before disposal of the cleaning pad will become necessary.

30 In a third aspect of the invention, the invention is comprised of a method for picking up debris using a cleaning device comprising a support member and a cleaning pad, wherein the support member is comprised of a support surface, wherein the cleaning pad

has an attachment side and a substrate side, wherein the attachment side is adapted to be releasably attached with the support surface, and wherein the substrate side is adapted to accept an application of an adhesive material, the method comprising the following steps:

- 5 (a) releasably attaching the attachment side of the cleaning pad with the support surface of the support member;
- (b) applying a layer of the adhesive material to the substrate side of the cleaning pad; and
- 10 (c) contacting the substrate side of the cleaning pad with the debris to pick up the debris.

Preferably, the method of the invention is performed using the preferred  
15 form of the cleaning device as described above. However, any suitable cleaning device having the properties discussed herein may be used.

Further, the releasably attaching step may be comprised of any process and may be performed by any mechanism or structure capable of releasably attaching the  
20 attachment side of the cleaning pad with the support surface of the support member. However, preferably, the releasably attaching step is performed using a releasable attachment mechanism as described above.

The applying step may similarly be comprised of any process and may be  
25 performed by any mechanism or structure capable of applying a layer of the adhesive material to the substrate side of the cleaning pad. For instance, as discussed above, the applying step may be comprised of brushing or sponging a layer of the adhesive matter on the substrate side. However, in the preferred embodiment, the applying step is comprised of spraying a layer of the adhesive material on the substrate side.

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The contacting step may be performed in any manner and by any process able to bring the substrate side of the cleaning pad into proximity or contact with the debris. Typically, the contacting step will be comprised of moving the cleaning pad into proximity

with the debris and applying pressure through the cleaning pad such that the debris adheres to the cleaning pad.

As discussed above, the cleaning device is preferably rechargeable.  
5 Therefore, in the preferred embodiment of the method, the method further comprises repeating steps (b) and (c) after completing step (c) to form on the substrate side of the cleaning pad a plurality of layers of the adhesive material interspersed with the debris.

In addition, as discussed above, once recharging of the cleaning pad is no  
10 longer desirable or practical, the cleaning pad is preferably disposed of and replaced with a replacement cleaning pad, and the cleaning method is repeated as necessary.

As a result, the method may include the further step of: (d) detaching the attachment side of the cleaning pad from the support surface of the support member. The  
15 detaching step is preferably performed by simply releasing the releasable attachment mechanism.

In addition, the method may further comprise the following steps:

- 20 (e) releasably attaching an attachment side of a replacement cleaning pad with the support surface of the support member;
- (f) applying a layer of the adhesive material to the substrate side of the replacement cleaning pad; and
- 25 (g) contacting the substrate side of the replacement cleaning pad with the debris to pick up the debris.

Each of steps (e) through (g) is preferably performed in a manner substantially similar to  
30 steps (a) through (c) as described above. In addition, recharging of the replacement cleaning pad may be desirable. Accordingly, the method further preferably comprises repeating steps (f) and (g) after completing step (e) to form on the substrate side of the

replacement cleaning pad a plurality of layers of the adhesive material interspersed with the debris.

5 Finally, once recharging of the replacement cleaning pad is no longer desirable or practical, the replacement cleaning pad may also be disposed of. As a result, the method may further comprise the following step: (h) detaching the attachment side of the replacement cleaning pad from the support surface of the support member.

10 The cleaning device and system of the present invention provide an effective cleaning system which can conveniently be manufactured and sold both as a complete system and as a product line comprising a number of products.

In particular, a complete "starter" system may be sold, which starter system could include the following components:

15

(a) the support member, with or without a handle (permanently or removably attached), or with an assortment of different handles for different applications of the system;

20

(b) a supply of disposable and rechargeable cleaning pads;

(c) a supply of adhesive material; and

(d) an adhesive material applicator.

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The supply of adhesive material and the adhesive material applicator may be separate components of the system or they may be integrated into a single component of the system.

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Where the adhesive material and the adhesive material applicator are separate components of the system, the adhesive material applicator may comprise a simple device such as a brush, sponge, roller or tube or may comprise a more sophisticated device such as a rechargeable bottle or rechargeable tube.



Where the adhesive material and the adhesive material applicator are integrated into a single component of the system, the adhesive material applicator is preferably a relatively inexpensive device which is disposed of once the supply of adhesive material is exhausted or consumed. For example, in the preferred embodiment, the supply of adhesive material and the adhesive material applicator are integrated into a single component of the system which comprises a disposable aerosol applicator such as an aerosol can.

A product line of individual components of the complete system could also be sold separately from the complete system. For example:

(a) different handles could be sold for attachment with the support member so that the cleaning device may be used for a broader range of applications;

(b) different shapes and sizes of support members could be sold for attachment with an assortment of handles so that the cleaning device may be used for a broader range of applications;

(c) a supply of replacement cleaning pads (possibly of different shapes and sizes for use with different support members) could be sold so that the complete system does not require replacement once the original supply of cleaning pads is used and disposed of;

(d) a replacement supply of adhesive material could be sold in circumstances where the adhesive material and the adhesive material applicator are not integrated into a single component of the system so that the complete system does not require replacement once the original supply of adhesive material has been consumed;

(e) a replacement adhesive material applicator (such as a brush, sponge, roller, tube, bottle etc.) could be sold in circumstances where the adhesive material and the adhesive material applicator are not integrated into a single

component of the system so that the complete system does not require replacement if the original adhesive material applicator breaks or wears out; and

- 5           (f)    an integrated replacement supply of adhesive material and adhesive material applicator (such as an aerosol can) could be sold in circumstances where the adhesive material and the adhesive material applicator are integrated into a single component of the system.

10    BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will now be described with reference to the accompanying drawings, in which:

- 15           Figure 1 is a pictorial side view of a preferred embodiment of a cleaning device comprised of a support member and a cleaning pad;

Figure 2 is a pictorial top view of the support member shown in Figure 1;

- 20           Figure 3 is a pictorial bottom view of the support member shown in Figure 1;

Figure 4 is a pictorial view of the support member and the cleaning pad attached thereto as shown in Figure 1;

- 25           Figure 5 is a pictorial view of the cleaning pad of Figure 1 shown in isolation; and

Figure 6 is a pictorial side view of a preferred embodiment of a cleaning device system.

30

DETAILED DESCRIPTION

Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings wherein like numerals indicate the same elements throughout the views.

5 Referring to FIG. 1 and FIG. 6, the within invention is directed at a cleaning device 10 for picking up debris and a cleaning device system 11. The cleaning device 10 is comprised of a support member 12 including a support surface 13 and a cleaning pad 14 for releasable attachment with the support member 12 and adapted to accept an application of an adhesive material 16. The cleaning device 10 is also further preferably comprised of the  
10 adhesive material 16, as well as an adhesive material applicator 18 as shown in FIG. 6 for applying the adhesive material 16 to the cleaning pad 14 as discussed below.

The cleaning device system 11 is comprised of the support member 12 including the support surface 13 and the cleaning pad 14 which is adapted for releasable  
15 attachment with the support member 12 and further adapted to accept an application of the adhesive material 16. The system 11 is further comprised of an amount of the adhesive material 16 and the adhesive material applicator 18 for applying the adhesive material 16 to the cleaning pad 14.

20 To facilitate the use of the device 10 or system 11, the device 10 and system 11 are preferably comprised of a handle 20 connected with the support member 12. The handle 20 may be made of any suitable material, such as wood, metal, plastic, composites or combinations of materials. However, a material is preferably selected which is lightweight for ease of use by the user.

25 In the preferred embodiment, the handle 20 includes an elongated portion or rod 22 extending between an upper end 24 for gripping by the user and a lower end 26 for attachment or connection with the support member 12. The elongated rod 22 is of sufficient length for the intended job to be done. For example, the elongated rod 22 preferably has a  
30 length of about 3 to 4 feet (about 91.44 to 121.92 cm) would be preferable so that a user of average height may stand comfortably without substantial bending over while using the device 10 or system 11 for picking up items off a floor. A longer elongated rod 22 of the handle 20 may be provided for reaching high ceilings, etc. As well, an adjustable elongated

rod 22 may be provided so that the user may adjust the length of the handle 20 as required for a particular application.

5 The handle 20 is preferably made of a rigid, lightweight tubing, such as aluminum or plastic, and preferably has a substantially circular cross section. In the preferred embodiment, the handle 20 is comprised of aluminum tubing. Further, although the handle 20 may have any shape, the upper end 24 of the handle 20 is preferably provided with a curved end 28 and a grip portion 30, wherein the grip portion 30 has a longitudinal axis 32 that is preferably generally perpendicular to a longitudinal axis 34 of the elongated  
10 rod 22 of the handle 20 to provide a comfortable hand position for the user. However, any angle may be provided between the longitudinal axis 32 of the grip portion 30 and the longitudinal axis 34 of the elongated rod 22.

As indicated, the handle 20 is connected with the support member 12. In the  
15 preferred embodiment, the lower end 26 of the handle 20 is connected with the support member 12. More particularly, the lower end 26 of the handle 20 is connected with the support member 12 at a location or position on the support member 12 opposed to the support surface 13. As a result, the user may relatively easily apply pressure through the handle 20 to the cleaning pad 14 in order to pick up the desired object or debris.

20

In addition, the handle 20 is preferably movably connected with the support member 12 to permit adjustment of the angle between the handle 20, and particularly the longitudinal axis 34 of the elongated rod 22, and the support member 12. In the preferred embodiment, the handle 20 is pivotably connected with the support member 12 such that the  
25 handle 20 is capable of pivoting about two axes relative to the support member 12.

More particularly, referring to FIGS. 2 - 4, in the preferred embodiment, the support member 12 includes a first side or top surface 36 and an opposed second side or planar bottom surface 38, wherein the support surface 13 is comprised of the planar bottom surface 38 of the support member 12. The top surface 36 preferably has a central hub 40 from which one or more reinforcement ribs 42 may radiate to limit the flexibility of the support member 12. Further, in the preferred embodiment, the support member 12 is rectangular in shape and reinforcement ribs 42 extend longitudinally from the hub 40.  
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Further, the lower end 26 of the handle 20 is preferably connected with the top surface 36 of the support member 12. Although it may be connected at any position on the top surface 36, the lower end 26 of the handle 20 is preferably connected substantially centrally in order to define the central hub 40.

The top surface 36 of the support member 12 and the lower end 26 of the handle 20 are preferably pivotably connected by a universal joint structure 44 to provide articulation, or angle adjustments of the handle 20 relative to the support member 12 as desired.

Referring to FIGS. 2 - 4, the universal joint structure 44 is comprised of an upper swivel 46 and a lower swivel 48 which provide for rotation about two axes which are preferably oriented at substantially right angles to each other. The lower swivel 48 is comprised of a lower pivot pin or shaft 50, which preferably defines a first rotational axis of the universal joint structure 44. The lower pivot pin 50 is mounted on the support member 12 preferably at the location of the central hub 40. Further, in the preferred embodiment, the lower pivot pin 50 is mounted or affixed with or within the longitudinal reinforcement ribs 42 which comprise the top surface 36 of the support member 12. Referring to FIG. 2, the lower pivot pin 50 is preferably mounted longitudinally between a pair of opposed reinforcement ribs 42 such that the lower pivot pin 50 is substantially aligned along the longitudinal axis of the rectangular support member 12.

The universal joint structure 44 is further comprised of a coupling member 52 having an upper end 54 and a lower end 56. In the preferred embodiment, the coupling member 52 forms and comprises the lower end 26 of the handle 20. The lower pivot pin 50 engages the lower end 56 of the coupling member 52 such that the coupling member 52 is pivotable about the lower pivot pin 50.

The upper swivel 46 is comprised of an upper pivot pin or shaft 58, which preferably defines a second rotational axis of the universal joint structure 44, which is preferably substantially perpendicular to the first rotational axis of the universal joint structure 44. The upper pivot pin 58 is mounted on the handle 20. More particularly, the

lower end 26 of the handle is preferably comprised of a receiving member 60 for receiving an end of the elongated rod 22, which is held in place by a rivet 62 or other fastener. Alternatively, as is well known in the art, the end of the elongated rod 22 may be provided with external threads (not shown) and the receiving member 60 may be provided with internal threads (not shown) which receive the threads of the elongated rod 22.

In the preferred embodiment, the upper pivot pin 58 is mounted with or within the receiving member 60 such that the upper pivot pin 58 is aligned substantially perpendicular to the longitudinal axis 34 of the elongated rod 22 of the handle 20. The upper pivot pin 58 engages the upper end 54 of the coupling member 52 such that the receiving member 60 and the elongated rod 22 are pivotable about the upper pivot pin 58.

As indicated, the support member 12 includes a planar support surface 13 for releasable attachment with the cleaning pad 14. The support surface 13 is preferably planar to facilitate the ease of attachment of the cleaning pad 14 thereto and to facilitate the use of the device 10 or system 11 for the picking up of debris from a planar surface such as the ground, floor or ceiling.

Referring to FIGS. 3 - 6, the cleaning pad 14 has an attachment side 64 and a substrate side 66. In the device 10, the attachment side 64 is releasably attached or attachable with the support surface 13. In the system 11, the attachment side 64 is adapted to be releasably attachable with the support surface 13. As a result, the cleaning pad 14 may be removed as desired or as required for disposal and in order to permit the attachment of a replacement cleaning pad 14.

The releasable attachment is preferably provided by a releasable attachment mechanism, preferably a hook and loop fastening system 68. The hook and loop fastening system 68 maintains the attachment of the cleaning pad 14 to the support surface 13 of the support member 12 upon exposure of the cleaning pad 14 to stresses or forces typically or reasonably anticipated to be encountered during use.

Further, in the preferred embodiment, the cleaning pad 14 is comprised of two layers. The attachment side 64 of the cleaning pad 14 is comprised of an attachment

layer 70 and the substrate side 66 of the cleaning pad 14 is preferably comprised of a substrate layer 72. The attachment layer 70 of the cleaning pad 14 is releasably attached or attachable with the support surface 13.

5           In the preferred embodiment, the hook and loop fastening system 68 is comprised of a hook portion 74 and a loop portion 76. Preferably, the attachment side 64 of the cleaning pad 14, and particularly the attachment layer 70, comprises the loop portion 76 of the hook and loop fastening system 68. Further, preferably, the support surface 13 of the support member 12 forms or comprises the hook portion 74 of the hook and loop fastening  
10       system 68.

          The attachment layer 70 is releasably attached or attachable with the support surface 13. In the preferred embodiment, the support surface 13 is comprised of a fabric hook pad 78, which is itself comprised of fabric hooks of the type employed in a Velcro™  
15       type fabric fastener. In a preferred embodiment, the fabric hook pad 78 is constructed from a hook and loop fastener product manufactured or sold by American & Efird Canada, Inc. having stock number THFAFR-75.

          The hook pad 78 is preferably fixedly attached with the support surface 13  
20       by an adhesive or glue which firmly affixes the backing of the fabric hook pad 78 to the support surface 13. Alternatively, a plurality of smaller Velcro™ type hook pads may be used instead of one larger hook pad 78, provided that the total area of the smaller hook-pads is sufficient to fasten the cleaning pad 14 firmly to the support surface 13.

25           The fabric hook pad 78 of the support surface 13, which provides the hook portion 74 of the hook and loop fastening system 68, is releasably attached or attachable to the attachment layer 70 of the cleaning pad 14 which provides the compatible loop portion 76. In the preferred embodiment, the attachment layer 70 is comprised of fabric loops 80 such as the type employed in a Velcro™ type fabric fastener, or other material which will  
30       fasten to fabric hooks such as a non-woven fabric or a felt having a fibrous surface sufficient to be fastened to fabric hooks. The entire attachment side 64 of the cleaning pad 14 is preferably comprised of the fabric loops 80. However, alternately, one or more distinct patches or groupings of fabric loops 80 may provide the attachment layer 70.

In a preferred embodiment, the attachment layer 70 is particularly comprised of a fabric referred to as a brush fabric and sold by Rentex Mills Inc. under the name of Rentex™ #4371. Rentex™ #4371 is a 100% nylon wrap knit.

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The layers of the cleaning pad 14, being the attachment layer 70 and the substrate layer 72, are bonded together, preferably by heat lamination. Alternatively, the layers may be joined together in any convenient manner, such as for example, by adhesive bonding, stitching, or the like. The resulting cleaning pad 14 preferably provides a relatively thin cushion, preferably about 0.125 inches (0.3175 cm) thick. However, less or greater thicknesses may be used. Preferably, both the thickness and the composition of the layers of the cleaning pad 14 are selected such that the cleaning pad 14 is relatively resilient in order that the cleaning pad 14 is capable of conforming to the surface to be cleaned.

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The substrate side 66 of the cleaning pad 14 is comprised of the substrate layer 72. The substrate layer 72 is selected such that it is capable of, and suitable for, accepting an application of the adhesive material 16 thereon. In the preferred embodiment, the substrate layer 72 itself does not exhibit adhesive properties. Rather, the adhesive material 14 is required to be applied in order for the debris to adhere to the cleaning pad 14. Further, the substrate layer 72 is preferably selected such that the adhesive material 16 is not significantly absorbed by the substrate layer 72 or such that the adhesive material 16 does not significantly permeate or impregnate the substrate layer 72. In other words, it is preferred that the substrate layer 72 permit a substantially surface application of the adhesive material 16 only.

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Preferably, the substrate layer 72 is comprised of a foam material, more preferably a microporous foam of synthetic plastic material such as, for example polyolefin, polyamide, polyvinyl, polyethylene or the like. In the preferred embodiment, the substrate layer 72 is comprised of a polyolefin foam material and more preferably, a closed cell polyethylene foam material.

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A preferred form of a closed cell polyethylene foam material is commercially available in Canada and the United States of America from Sekisui America Corporation



under the trade-mark Volara® 2A. Volara® 2A is a fine-celled, irradiation crosslinked polyethylene foam. Crosslinking bonds the molecules of the polyolefin resin into a structure that gives the polymer increased strength. Crosslinking may be achieved by either physical means, such as through irradiation by an electron beam, or chemical means.

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Further, the preferred foam is closed cell. Open-celled foams provide an interconnecting cell structure which permits absorption of liquids and provides a relatively softer foam structure. Closed-cell foams tend to provide for relatively lower liquid absorption and enhanced structural integrity. In addition, the density of the foam is preferably selected to provide the substrate layer 72 with a desired degree of flexibility and resiliency. Typically, the structural properties of the foam material improve proportionately with increasing density, however, the softness and flexibility generally decrease.

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In the preferred embodiment, the substrate layer 72 is therefore comprised of 2 lb. closed cell, cross linked polyethylene foam sold under the trade name Volara® 2A and having the characteristics listed in Table 1.

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TABLE 1

20	Normal Density PCF	-	2.0
	Compression Strength @ 25% PSI	-	6.0
25	Compression Strength @ 50% PSI	-	15.0
	Tensile Strength PSI	-	49.5
	Elongation % To Break	-	107.0
30	Tear Resistance lb./in	-	13.0
	Compression Set % Original Thickness	-	21.0
35	Maximum Working Temperature* (degree fahrenheit)	-	200
	Minimum Working Temperature* (degree fahrenheit)	-	-110
40	Water Absorption	-	0.04

lbs./cut surface max.

K-Factor BTU/(hr.)(ft.<sup>2</sup>) - 0.25  
(degree fahrenheit in.)

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\*Maximum working temperature represents less than 5% shrinkage.

The adhesive material 16 is applied to the substrate layer 72 of the cleaning pad 14. Thus, when the substrate side 66 of the cleaning pad 14 contacts the debris, the debris adheres to the cleaning pad 14. Any suitable polymer may comprise the adhesive material 16 including a pressure sensitive adhesive, an adhesive polymer, a tacky polymer or combinations thereof.

Preferably, the adhesive material 16 has one or more of a number of various preferable properties. First, the adhesive material 16 is preferably substantially non-transferable such that no amount, or no significant amount, of the adhesive material 16 is transferred from the substrate side 66 of the cleaning pad 14 to the surface being cleaned upon use of the cleaning pad 14. Second, the adhesive material 16 preferably has a curing time of less than about one minute, and preferably less than about 30 seconds, after it is applied to the substrate layer 72.

Third, the adhesive material 16 preferably has a tack value which is sufficiently high to enable the cleaning pad 14 to pick up the debris effectively. The tack value refers to the maximum adhesive strength of the adhesive material 16, which will vary depending upon the particular use of the device 10 or system 11 and the properties, including the weight, of the debris or other material to be picked up by the cleaning pad 14. Fifth, the adhesive material 16 is preferably non-toxic. Sixth, the adhesive material 16 is preferably odorless.

The adhesive material 16 may be comprised of an adhesive substance commercially available in Canada from ODIF S.A. of France under the trade-mark 505 Temporary Adhesive<sup>TM</sup>. However, 505 Temporary Adhesive<sup>TM</sup> may not be preferable in some applications. Specifically, it has been found that 505 Temporary Adhesive<sup>TM</sup> tends to have a relatively long curing time and may not have a sufficient tack value for some applications of the device and system.

As a result, in the preferred embodiment, the adhesive material 16 is comprised of a modified formulation of 505 Temporary Adhesive<sup>TM</sup>. Specifically, the modified formulation is commercially available in Canada from ODIF S.A. of France under the trade-mark Tacky Tool<sup>TM</sup> Recharger Adhesive. The Tacky Tool<sup>TM</sup> Recharger Adhesive has been found to have improved properties including a relatively faster curing rate and higher tack values, while still providing the other desirable properties of the adhesive material 16, including low transferability or non-transferability of the adhesive material 16.

For instance, it has been found through testing of the cleaning device system that the Tacky Tool<sup>TM</sup> Recharger Adhesive has a curing time of less than or equal to about 30 seconds upon its initial or first application to the substrate layer 72 and a curing time of less than or equal to about 5 seconds upon its subsequent application to the debris or recharging of the cleaning pad 14. Further, any over-spray of the Tacky Tool<sup>TM</sup> Recharger Adhesive has been found to dry within about 18 inches (45.72 cm) of its point of discharge to an inert and harmless powder.

Finally, referring to FIG. 6, the device 10 and system 11 preferably include an adhesive material applicator 18. In the preferred embodiment, the adhesive material applicator 18 is an aerosol applicator. Further, an amount of the adhesive material 16 is contained within the adhesive material applicator 18 so that the adhesive material 16 can be sprayed onto the substrate layer 72 of the cleaning pad 14. In the preferred embodiment the adhesive material 16 and the adhesive material applicator 18 are therefore integrated into a single component of the system, wherein the aerosol applicator is discarded once the adhesive material 16 contained within it is exhausted.

The application of the adhesive material 16 to the cleaning pad 14 by spraying by the adhesive material applicator 18 is referred to as charging the cleaning pad 14. The cleaning pad 14 may be re-sprayed or re-charged as necessary by simply spraying a further layer of the adhesive material 16 on the substrate layer 72 and any debris that may have collected thereon during use. Recharging of the cleaning pad 14 will typically occur as the tackiness of the adhesive material 16 decreases with use or as the cleaning pad 14 becomes clogged or loaded with debris. Accordingly, the plurality of layers of adhesive

material 16 is interspersed with the debris. In other words, the recharging or the further layers of the adhesive material 16 are applied to the substrate layer 72 by spraying over the debris already adhered to the cleaning pad 14.

5           The cleaning pad 14 is replaceable when recharging of the cleaning pad 14 is no longer practical or desirable. Preferably, the cleaning pad 14 will be rechargeable at least 6 times, and more preferably, at least 10 times before disposal of the cleaning pad 14 and replacement by a replacement cleaning pad 14 becomes necessary.

10           The within invention is also comprised of a method for picking of debris using a cleaning device, preferably the cleaning device 10 as described herein. Accordingly, in the preferred embodiment of the method, the attachment layer 70 of the cleaning pad 14 is releasably attached to the support surface 13 of the support member 12 by engaging the fabric hook pad 78 with the fabric loops 80.

15           The rechargeable adhesive material 16 is then applied, by spraying from the adhesive material applicator 18, onto the substrate layer 72 of the cleaning pad 14. The cleaning device 10 is then used to pick up lint and other debris from a carpet or other surface. More particularly, the substrate side 66 of the cleaning pad 14 is contacted and  
20           applied to the debris in order that the debris adheres to the cleaning pad 14.

          Once debris has accumulated on the cleaning pad 14 and as the tackiness of the cleaning pad 14 diminishes, the cleaning pad 14 may be recharged with the adhesive material 16 by spraying another layer of the adhesive material 16 onto the substrate layer 72  
25           directly over the debris which has already accumulated on the cleaning pad 14.

          Further, when recharging of the cleaning pad 14 is no longer feasible, the cleaning pad 14 may be removed by detaching the attachment layer 70 of the cleaning pad 14 from the support surface 13 for disposal of the cleaning pad 14, and a replacement  
30           cleaning pad 14 may then be affixed in place of the previous cleaning pad 14. The application of the adhesive material 14 and the contacting of the debris may then be repeated as necessary.

The foregoing description of the preferred embodiments of the invention have been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Modifications or variations are possible and contemplated in light of the above teachings by those skilled in the art, and the embodiments discussed were chosen and described in order to best illustrate the principles of the invention and its practical application. It is intended that the scope of the invention be defined by the claims appended hereto.